

II.4-RES-SNGL-A-RULEADJ SINGLE RESERVOIR REGULATION OPERATION
UTILITY RULE CURVE ADJUSTMENT

Description

Utility RULEADJ computes a constant adjustment value by averaging the deviations between the observed pool elevations and the rule curve elevations.

Many reservoirs are operated with the guidance of a rule curve that prescribes the pool elevation for each day of the year. The rule curve is used to control the operation of reservoirs that are used for various purposes such as power generation, recreation, irrigation, flood control, water supply and navigation.

For various reasons dam operators may deviate from the scheduled rule curve elevations. In order to estimate the trend and amount of variation, the rule curve adjustment Utility compares the observed pool elevations (ELEV) with the rule curve elevations for each time interval within a designated number of time intervals (PERIODS). An adjustment value, AVGDEV, is computed by averaging the PERIODS values of differences between the observed and the rule curve elevations. This adjustment is then applied to the rule curve elevation for future time intervals to compensate for the operator's deviation from the rule curve elevation.

The deviation array, which holds the differences between the observed and the rule curve elevations, is computed from the following equation:

$$DEV(IT) = ELEV(IT) - RULEL(IT) \quad IT = 1 \dots PERIODS$$

where ELEV are the observed pool elevations
RULEL are the rule curve elevations
PERIODS is the designated number of time intervals for comparison of observed and rule curve elevations

Deviations vary with the availability of observed pool elevations, the limiting inflow values (MAXQI) and the maximum allowable difference (ELEVDIFF). The deviation array is revised during computation if necessary according to the following rules:

1. $DEV(IT) = DEV(IT-1)$ if ELEV(IT) is missing
2. $DEV(IT) = 0$ if $IT > NMISS$ and $NMISS > PERIODS/2$

where NMISS are the number of consecutive missing observed pool elevations starting from previous observed pool elevation

3. $DEV(IT) = 0$ if $DEV(IT) > ELEVDIFF$
4. $DEV(IT) = 0$ if $QI_2(IT) > MAXQI$

The last PERIODS deviations including the deviation from the last

observed pool elevation are used to compute the rule curve adjustment:

$$\text{AVGDEV} = \frac{\sum_{\text{IT1}}^{\text{IT2}} \text{DEV}(\text{IT})}{\text{PERIODS}}$$

where IT1 = LOBSTO - PERIODS + 1
IT2 = LOBSTO
LOBSTO is the last observed pool elevation or pool elevation generated from other observed data

AVGDEV is used in all reservoir Schemes to obtain the adjusted rule curve. The adjusted rule curve is then used to control the operation of reservoir.

PERIODS number of deviations prior to the first time interval will be saved in the carryover array. Those carryover deviations will be needed if LOBSTO < PERIODS in a forecast run.